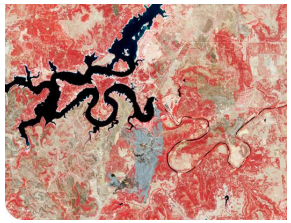
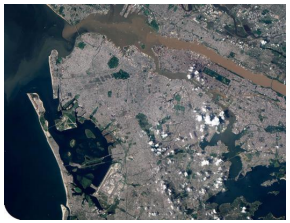
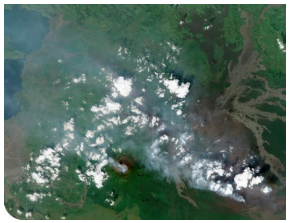






EXPLORING GLOBAL CLIMATE CHANGE THROUGH PROBLEM-BASED LEARNING

Laurie F. Ruberg, Ph.D., PI

Manetta Calinger, Curriculum Writer

Chuck Wood, Ph.D., Lead Scientist,

Cassie Lightfritz, Graphic Designer

Center for Educational Technologies

Wheeling Jesuit University, Wheeling, WV

EXPLORING the ENVIRONMENT GLOBAL CLIMATE CHANGE

CET Center for Educational Technologies

WHEELING JESUIT UNIVERSITY

Goals and Objectives

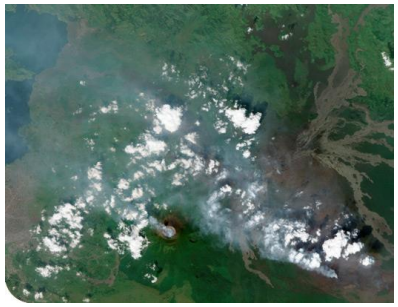
1. Build on existing Exploring the Environment problem-based learning (PBL) modules.
2. Recruit from a large body of teachers who are interested in this topic and approach.
3. Apply the recommendations from evaluation of previous projects and related research to the development of the new climate change PBL modules.
4. Organize a team with complementary skills and experience to design and develop effective resources for teaching and learning about global climate change.
5. Use existing NASA as well as other scientifically valid resources to support the study of global change.

Content

- Global Temperatures

- Ice Caps and Sea Levels

- Drought



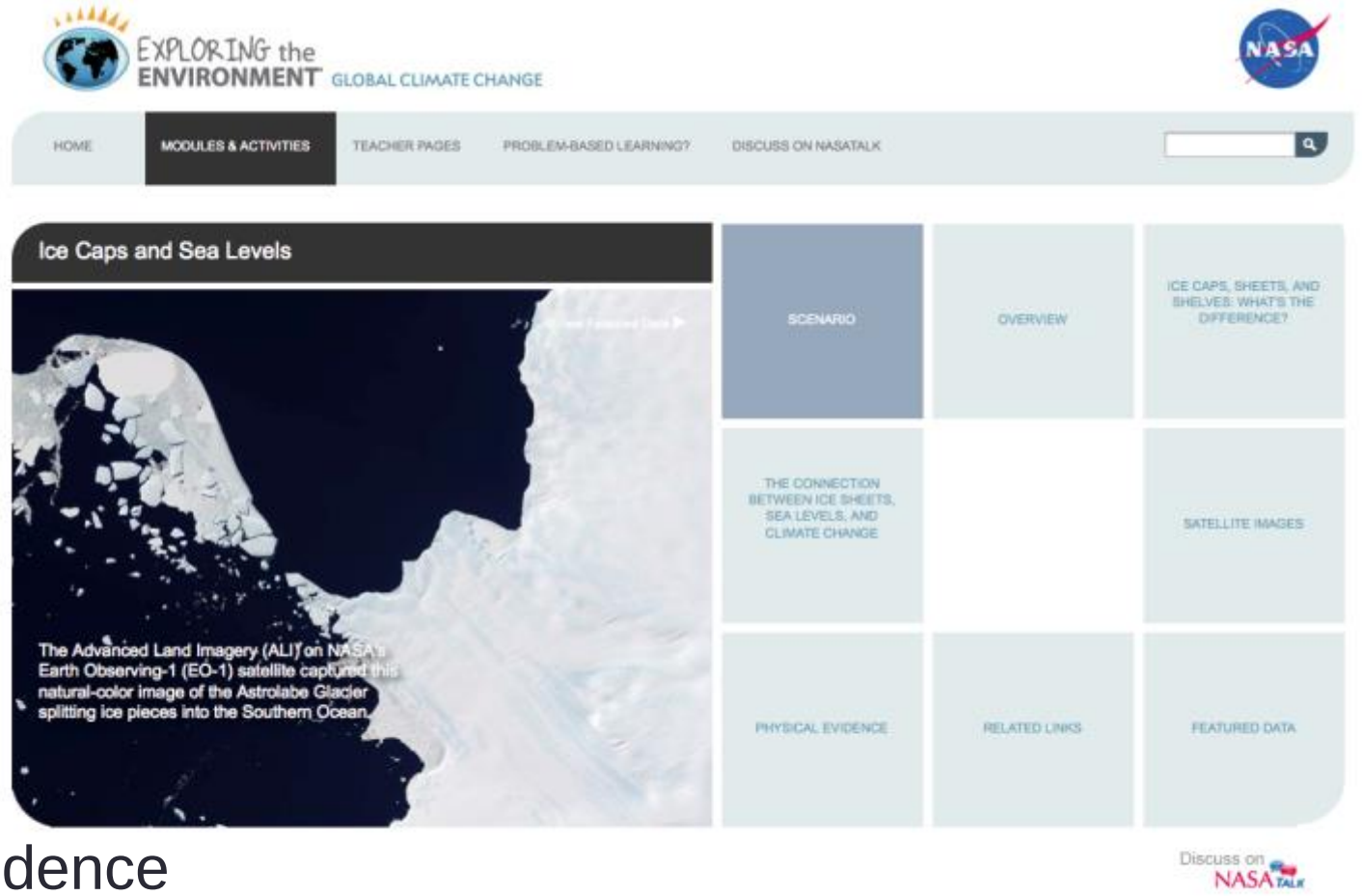
- Volcanoes

- Human Health Effects

- Biodiversity

Map of project features on the web

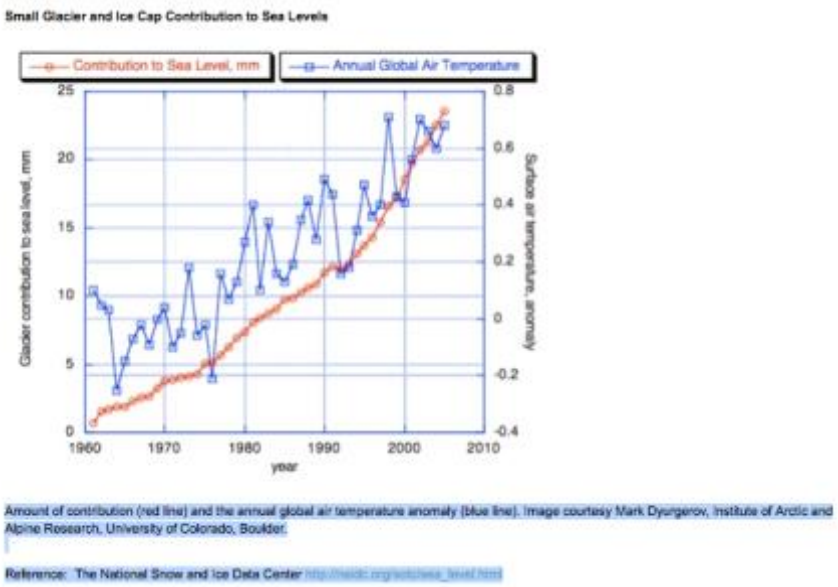
- Scenario
- Overview
- Scaffolding
- Satellite
  - Images
- Featured
  - Data
- Related
  - Links
- Physical Evidence



Scaffolding

- A structure added to support learning
- An introduction to the relevant global climate concepts with annotated links to data sources for further research
- Guidance for using the Earth system science process of analysis as part of the problem-solving process

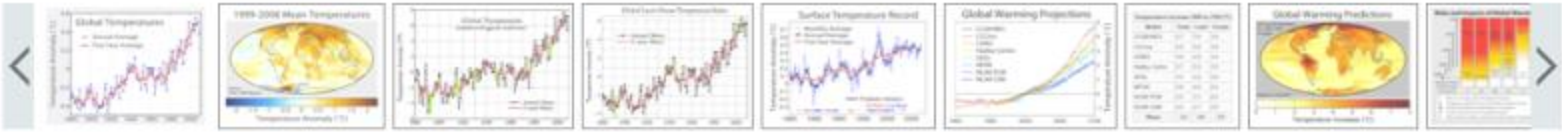
For example, in Ice Caps and Sea Levels, students have access to a presentation titled, The Connection Between Ice Sheets, Sea Levels, and Climate Change, and exemplary data such as the chart shown below, **Small Glacier and Ice Cap Contribution to Sea Levels.**



Amount of contribution (red line) and the annual global air temperature anomaly (blue line). Image courtesy Mark Dyurgerov, Institute of Arctic and Alpine Research, University of Colorado, Boulder.

Reference: The National Snow and Ice Data Center

Global Temperatures



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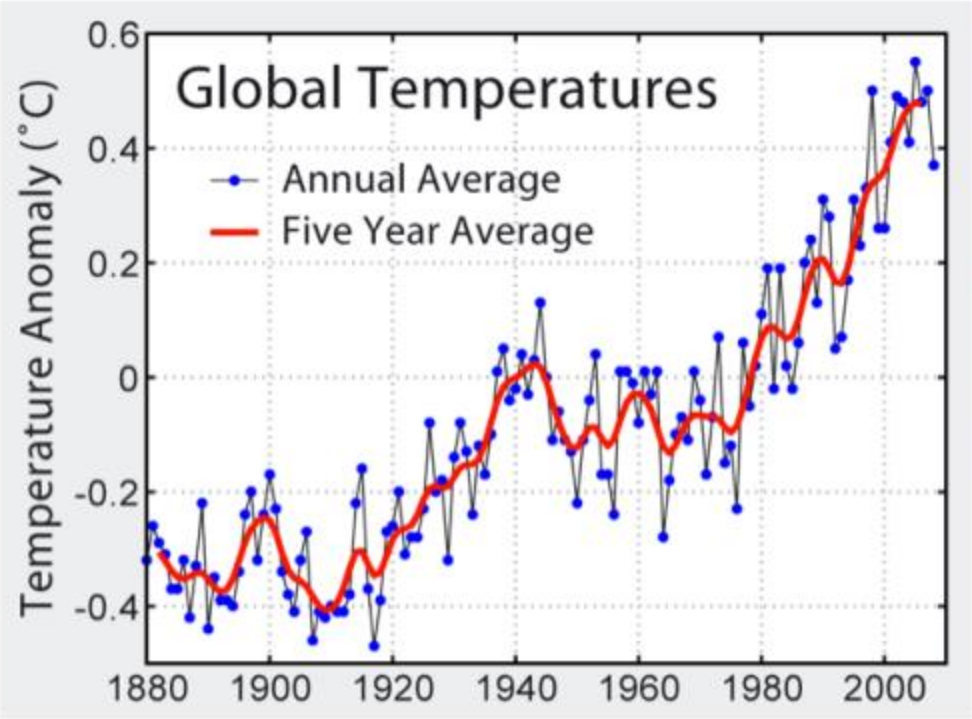


Global Temperature Trends

The record of global average temperatures compiled by NASA's Goddard Institute for Space Studies. The "zero" on this graph corresponds to the mean temperature from 1961-1990, as directed by the Intergovernmental Panel of Climate Change (IPCC).

Credits

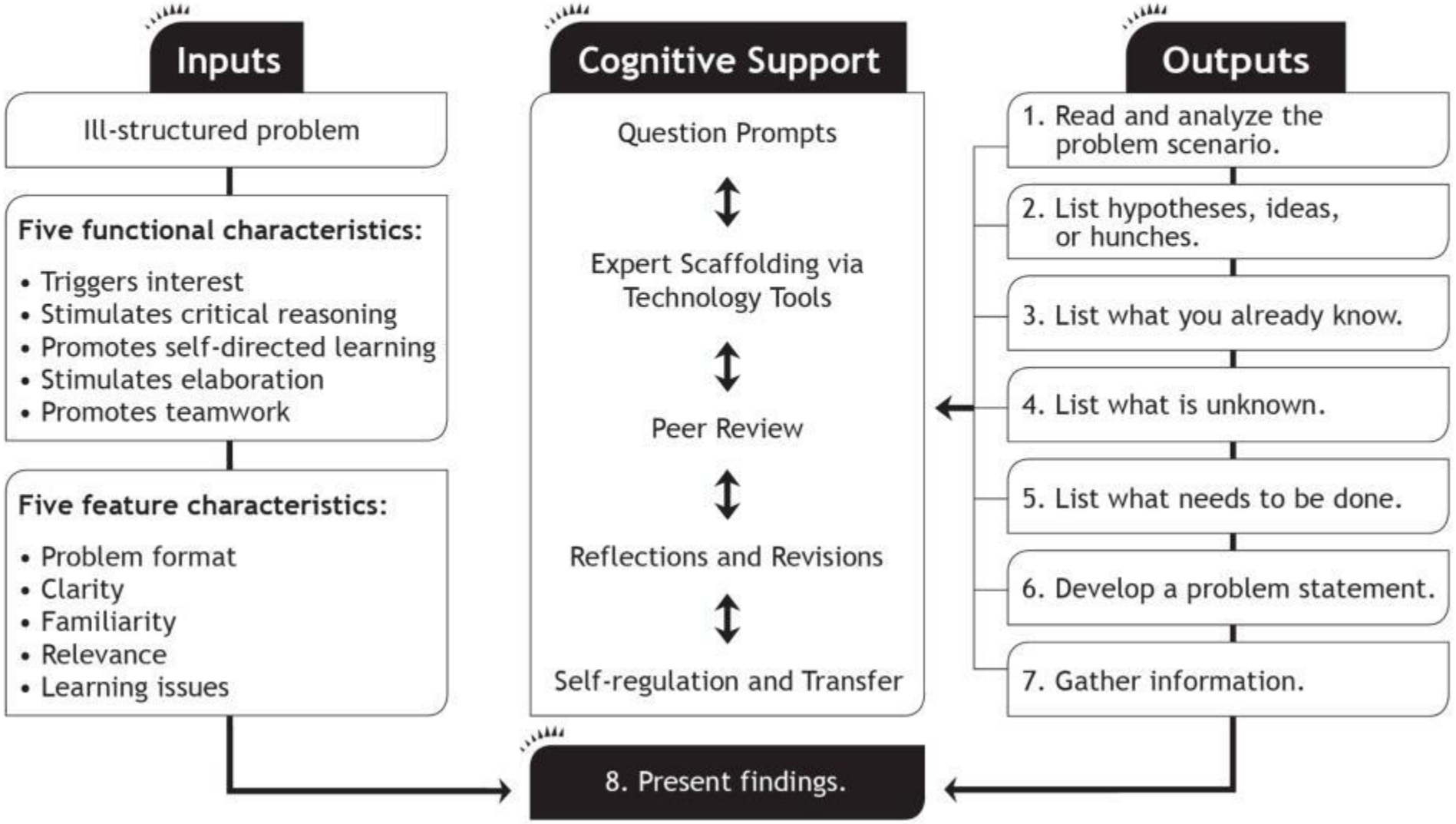
Image created by Robert A. Rohde/ Global Warming Art.

Hansen, J., Mki. Sato, R. Ruedy, K. Lo, D.W. Lea, and M. Medina-Elizade (2006). "Global temperature change". *Proc. Natl. Acad. Sci. 103*: 14288-14293.

Houghton, J.T.,Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.): Climate Change 2001: The Scientific Basis. *Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press. ISBN 0521807670.

Folland, C.K., N.A. Rayner, S.J. Brown, T.M. Smith, S.S.P. Shen, D.E. Parker, I. Macadam, P.D. Jones, R.N. Jones, N. Nicholls and D.M.H. Sexton (2001). "Global temperature change and its uncertainties since 1861". *Geophysical Research Letters 28*: 2621-2624.

Designing Cognitive Scaffolds for Web-based Problem-based Learning



Modifications based on pilot testing

Built-in support for teachers based on teacher requests and to reinforce instructional goals:

Teacher Resources

- Overview
- Teacher introduction
- Prep checklist
- The PBL model
- Learning in teams
- Developing rubrics
- Assessment
- Assessing behaviors
- Planning and facilitating
- Comparing approaches
- Table of environmental effects
- Classroom options
- Making it local

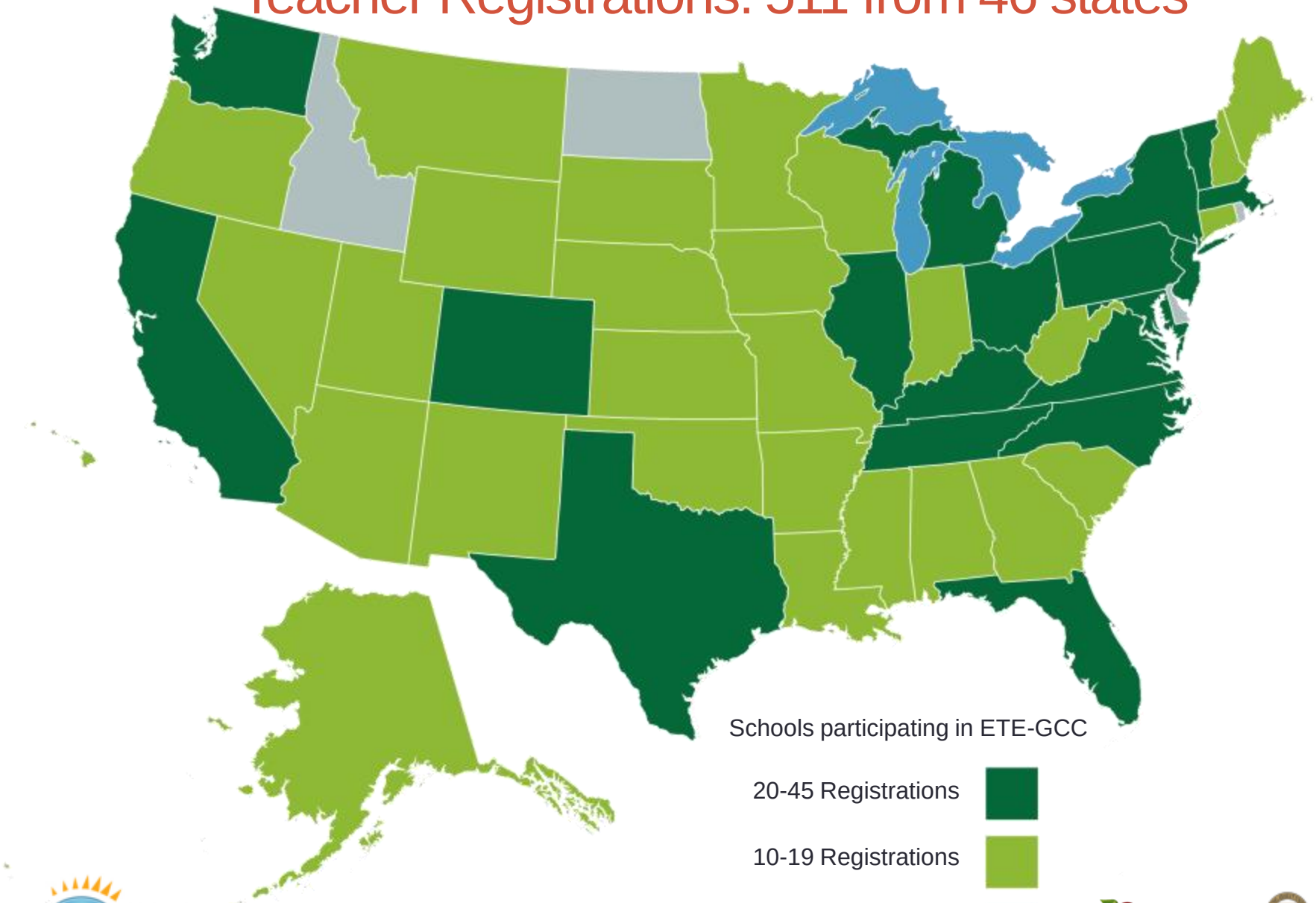
Additional Module: *Biodiversity*

Registration – required for access to teacher pages for each module

Web Analytics

	Extended Time Stats Oct 2011- Jan 2014	*Extended Time Stats Oct 2011- Jan 2014*	*Initial 5 mos. Oct 2011- Jan 2014*	*Most recent 5 mos. Oct 2013- Jan 2014*	*Peak Day Oct 22, 2012 2012*	*Peak Day Jan 9, 2014 2014*
	Web Log Expert	***Google Stats***	***Google Stats***	***Google Stats***	***Google Stats***	***Google Stats***
Unique visitors	795,030	72,290	316	23,864	707	496
Page views	1,306,851	211,134	6,166	45,881	1,683	1,539
Pages per visit	1.64	2.50	8.45	1.73	2.28	2.59
Bounce rate		69%	39%	80%	62%	73%
Avg. Visit duration		2:31	10:28	1:31	1:32	2:31
New Visitors		86%	43%	91%	93%	79%
Demographics	49% (US)	89% (US)	92% (US)	87% (US)	93% (US)	90% (US)

Teacher Registrations: 511 from 46 states



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Partnerships

- NASA Innovations in Climate Education (NICE)
- Tri-Agency Climate Education Catalog (TrACE)
- Trillium Associates – Evaluator
- GLOBE – Certified as GLOBE teacher trainer
- Earth System Science Education Alliance (ESSEA) associate member
- USGS Climate Education resources and training activities
- Green Schools Initiative
- Sustainable Learning Systems
- Wheeling Area Community Energy Program

Contact Us on NASA Talk

Exploring Global Climate Change Collaborative and Blog at: http://www.nasatalk.com/blog/list/bylines/133-eteglobal-climate-change.html OR
Email: ETE-GCC@cet.edu

EXPLORING the ENVIRONMENT
GLOBAL CLIMATE CHANGE

http://ete.cet.edu/gcc

Laurie Ruberg, Ph.D.
ETE-GCC, PI & Associate Director
Center for Educational Technologies
Wheeling Jesuit University, Wheeling, WV 26003
Email: lruberg@cet.edu
Tel: 304-243-2480

Chuck Wood, Ph.D.
Executive Director
Center for Educational Technologies
Wheeling Jesuit University, Wheeling, WV 26003
Email: chuckwood@cet.edu

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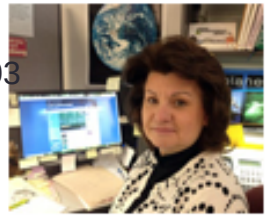
Manetta Calinger



Manetta Calinger
Curriculum Writer II
Global Climate Change
Center for Educational Technologies
Wheeling Jesuit University
Wheeling, WV 26003
mcalinger@cet.edu
(304) 243-4323

CET Center for Educational Technologies
WHEELING JESUIT UNIVERSITY